

**ABSTRACT OF THE DISCLOSURE**

The invention describes methods and systems for monitoring the performance of an optical network by introducing a fiber identification (FID) tag and/or bundle identification (BID) tag which are unique to the fiber section and to the bundle of fibers respectively. The FID tag is introduced by marking an optical signal, traveling through a section of fiber, with a low frequency dither tone whose frequency is unique to the fiber section. Similarly, the BID tag is introduced by marking an optical signal, traveling through a section of fiber in a bundle of fibers, with another low frequency dither tone whose frequency is unique to the bundle section. Detecting of the FID and BID tones either alone or along with an optionally introduced channel identification (CID) tone, which is unique to the optical signal, provides more effective and accurate monitoring of performance of the optical network and allows determining of the network topology, e.g. paths of optical channels and traffic load through different fiber sections in the network.